IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of:

Daryl E. Anderson et al.

Application No.: 10/757,104

Filed: January 13, 2004

For: A Temperature Compensated MEMS Device

Group Art Unit: 2629

Examiner: BODDIE, William

Confirmation No.: 2920

APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
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Sir:

This is an Appeal Brief under Rule 41.37 appealing the decision of the Primary Examiner dated March 24, 2008 (the "final Office Action" or "Action"). Each of the topics required by Rule 41.37 is presented herewith and is labeled appropriately.

I. Real Party in Interest

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. Related Appeals and Interferences

There are no appeals or interferences related to the present application of which the Appellant is aware.

III. Status of Claims

Claims 9, 22 and 55-62 have been cancelled previously without prejudice or disclaimer. Thus, claims 1-8, 10-21, 23-54 and 63 are pending in the application and stand finally rejected. Accordingly, Appellant appeals from the final rejection of claims 1-8, 10-21, 23-54 and 63, which claims are presented in the Appendix.

IV. Status of Amendments

No amendments have been filed subsequent to the final Office Action of March 24, 2008, from which Appellant takes this appeal.

V. Summary of Claimed Subject Matter

Claim 1 recites:

A diffractive light device (DLD) comprising:

a substrate (250) (*Appellant's specification, paragraph 0024*);

a force plate (240) disposed on said substrate (250), said force plate (240) configured to produce an electrostatic force in response to an applied voltage (*Appellant's specification, paragraph 0024*);

a pixel plate (210) supported by a flexure (220) adjacent to said force plate (240), wherein a position of said pixel plate (210) is controlled by said electrostatic force and by said flexure (220) coupled to said pixel plate (210) to display a pixel of an image(*Appellant's specification, paragraph 0024*);

a temperature sensor (270) thermally coupled to said flexure (220), without affecting movement of said flexure (220), and outputting a thermal measurement indicative of a temperature of said flexure (220) (*Appellant's specification, paragraph 0025*); and

a circuit (290, 280) that generates and applies a temperature compensated voltage to said force plate (240) in response to said thermal measurement produced by said temperature sensor (270) (*Appellant's specification, paragraph 0024*).

Claim 12 recites:

A micro-electro mechanical system (MEMS) comprising:

a substrate (250) (*Appellant's specification, paragraph 0024*);

a pixel plate (210) coupled to said substrate (250) (*Appellant's specification, paragraph 0024*);

a force plate (240) disposed on said substrate (250) adjacent to said pixel plate (210), wherein said force plate (240) is configured to exert an electrostatic force on said pixel plate (210) (*Appellant's specification, paragraph 0024*); and

a temperature sensor (270) thermally coupled to said MEMS (*Appellant's specification, paragraph 0025*);

wherein said MEMS is configured to adjust said electrostatic force in response to a temperature measurement performed by said temperature sensor (270) (*Appellant's specification, paragraph 0024*).

Claim 24 recites:

An image display device comprising:

a system controller (290) (*Appellant's specification, paragraph 0024*);

a variable voltage source (280) communicatively coupled to said system controller (290) (*Appellant's specification, paragraph 0024 and Fig. 2*); and

an array of DLDs (200) communicatively coupled to said variable voltage source (*Appellant's specification, paragraph 0026*), each DLD (200) of said DLD array including a substrate (250) (*Appellant's specification, paragraph 0024*), a force plate (240) disposed on said substrate (250) (*Appellant's specification, paragraph 0024*), said force plate (240) configured to produce an electrostatic force in response to a voltage applied by said voltage source (280) (*Appellant's specification, paragraph 0024*), a pixel plate (210) disposed adjacent to said force plate (240) (*Appellant's specification, Fig. 2*), wherein a position of said pixel plate (210) is determined by said electrostatic force and a flexure (220) coupled to said pixel plate (210), and a temperature sensor (270) thermally coupled to said DLD so as to

determine a temperature of said flexure (220) (*Appellant's specification, paragraph 0025*), wherein said image display device is configured to vary said electrostatic force in response to a temperature measurement performed by said temperature sensor (270) (*Appellant's specification, paragraph 0025*).

Claim 31 recites:

A diffractive light device (DLD) comprising:

a substrate (250) (*Appellant's specification, paragraph 0024*);

a means for producing an electrostatic force (240) disposed on said substrate (250) (*Appellant's specification, paragraph 0024*), wherein said electrostatic force is produced in response to an applied voltage;

a means for diffracting light (210) disposed adjacent to said electrostatic force producing means (240) (*Appellant's specification, Fig. 2*), wherein a position of said light diffracting means (210) is influenced by a means for flexing (220) coupled to said means for diffracting light (210) (*Appellant's specification, paragraph 0024*); and

a means for sensing temperature (270) thermally coupled to said DLD (*Appellant's specification, paragraph 0025*), wherein said means for sensing temperature (270) is configured to produce a temperature compensated voltage on said means for producing an electrostatic force (240) in response to a thermal measurement (*Appellant's specification, paragraph 0025*).

Claim 40 recites:

A method of compensating for thermal effects in a DLD comprising:

measuring (400) a temperature of said DLD (200) (*Appellant's specification, paragraph 0029*);

generating (430) a temperature compensated offset voltage associated with an effect said temperature will have on said DLD (*Appellant's specification, paragraph 0029*); and

producing (450) a temperature compensated voltage on said DLD using said temperature compensated offset voltage, wherein applying said temperature compensated voltage to said DLD compensates for said thermal effects (*Appellant's specification, paragraph 0029*).

Claim 50 recites:

A processor readable medium having instructions thereon that are executable by a processor (290) (*Appellant's specification, paragraph 0024*) for:

sensing a temperature change of a DLD (*Appellant's specification, paragraph 0025*); and

modifying a voltage provided to said DLD in response to said sensed temperature change (*Appellant's specification, paragraph 0026*).

VI. Grounds of Rejection to be Reviewed on Appeal

The final Office Action raised the following grounds of rejection.

(1) Claims 1, 12, 13, 24 and 31 were rejected as being unpatentable under 35 U.S.C. § 103(a) over what the Action characterizes as Appellant's Admitted Prior Art ("APA") in combination with the teachings of U.S. Patent No. 7,197,225 to Romo et al. ("Romo").

(2) Claims 2, 3, 5-8, 14-16, 18-21, 25, 26, 28, 29, 32, 33, 35-38, 56 and 63 were rejected under 35 U.S.C. § 103(a) over the combined teachings of the APA, Romo and U.S. Patent No. 5,088,806 to McCartney et al. ("McCartney").

(3) Claims 10, 11, 23, 30 and 39 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of APA, Romo and U.S. Patent No. 5,903,251 to Mori et al. ("Mori").

(4) Claims 4, 17, 27 and 34 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of APA, Romo and U.S. Patent No. 7,038,654 to Naiki et al. ("Naiki").

(5) Claims 40, 42, 44-46 and 49-54 were rejected as being unpatentable under 35 U.S.C. § 103(a) over the combined teachings of McCartney and APA.

(6) Claim 41 was rejected under 35 U.S.C. § 103(a) over the combined teachings of McCartney, APA and Romo. This rejection should not be sustained for at least the same reasons given above with respect to the patentability of claim 40.

(7) Claim 43 was rejected under 35 U.S.C. § 103(a) over the combined teachings of McCartney, APA and Naiki. This rejection should not be sustained for at least the same reasons given above with respect to the patentability of claim 40.

(8) Claims 47 and 48 were rejected under 35 U.S.C. § 103(a) over the combined teachings of McCartney, APA and Mori. This rejection should not be sustained for at least the same reasons given above with respect to the patentability of claim 40.

According, Appellant hereby requests review of each of these grounds of rejection in the present appeal.

VII. Argument

A preliminary issue in this appeal is whether the Examiner can rely on Appellant's Fig. 1 as admitted prior art. As Appellant has previously stated on the record, there was absolutely no intention on the part of Appellant to admit the subject matter in Fig. 1 as prior art.

Appellant has not designated or described Fig. 1 as representing the prior art. To the contrary, the discussion of Fig. 1 is in the "Detailed Description" portion of Appellant's specification, not the background. Moreover, Appellant's specification expressly states that "Fig. 1 is a cross-sectional view illustrating a DLD pixel cell *according to one exemplary embodiment*." (Appellant's specification, paragraph 0006) (emphasis added).

In response to this, the final Office Action cites paragraph 0023 of Appellant's specification (Action, p. 2) in which it is noted that DLD's similar to, or like, that shown in Fig. 1 have traditionally been used but that "an undesirable color shift may occur as the temperature of the DLD varies during operation." (Appellant's specification, paragraph 0023). The Action unfairly attempts to read into this lone statement that *every* detail of Fig. 1 must have been "traditionally used" and therefore be admitted prior art. This is a partial and over-reaching reading of paragraph 0023 from which the Appellant intended no such admission.

Just because Appellant states that similar devices have been traditionally used, subject to issues with temperature variation, does not mean that *all* the details, i.e., the configuration, arrangement and selection of elements in Fig. 1, were also traditionally used in the prior art. To the contrary, Fig. 1 represents the foundational work of the Appellant in this area with which Appellant has, in this application, addressed the issue of temperature variation. This is

why Fig. 1 is described as "a cross-sectional view illustrating a DLD pixel cell *according to one exemplary embodiment*." (Appellant's specification, paragraph 0006) (emphasis added).

The Examiner argues that "[t]his single phrase [referring to paragraph 0006] is not seen as sufficiently persuasive to rule out that the figure is indeed still admitted prior art." (Action, p. 2). Nevertheless, the Examiner seeks to hold Fig. 1 to be admitted prior art based solely on a *single* phrase from paragraph 0023. This is clearly not an impartial, reasonable or correct weighing of the evidence as to what Appellant did or did not admit.

To help settle this issue, Appellant wishes to direct attention to § 2129 of the MPEP, which reads as follows.

> A statement by an applicant in the specification or made during prosecution identifying the *work of another* as 'prior art' is an admission which can be relied upon for both anticipation and obviousness determinations, regardless of whether the admitted prior art would otherwise qualify as prior art under the statutory categories of 35 U.S.C. **102**. *Riverwood Int'l Corp. v. R.A. Jones & Co.*, 324 F.3d 1346, 1354, 66 USPQ2d 1331, 1337 (Fed. Cir. 2003); *Constant v. Advanced Micro-Devices Inc.*, 848 F.2d 1560, 1570, 7 USPQ2d 1057, 1063 (Fed. Cir. 1988). However, even if labeled as "prior art," the *work of the same inventive entity* may not be considered prior art against the claims unless it falls under one of the statutory categories [of § 102]. *Id.*; see also *Reading & Bates Construction Co. v. Baker Energy Resources Corp.*, 748 F.2d 645, 650, 223 USPQ 1168, 1172 (Fed. Cir. 1984) ("[W]here the inventor continues to improve upon his own work product, his foundational work product should not, without a statutory basis, be treated as prior art solely because he admits knowledge of his own work. It is common sense that an inventor, regardless of an admission, has knowledge of his own work.").

(MPEP § 2129) (emphasis in original).

Consequently, while Appellant may have mentioned the issue that Appellant is seeking to address in connection with Fig. 1 in paragraph 0023, that does *not* mean that every detail, feature and element or the configuration and arrangement of those elements shown in Fig. 1 was "traditional" in the prior art. Rather, Appellant respectfully submits that Fig. 1 represented the foundational work and design of the Appellant upon which the issue of temperature variation has been addressed in Appellant's specification. Consequently, as

stated in Appellant's specification, Fig. 1 is "a cross-sectional view illustrating a DLD pixel cell *according to one exemplary embodiment*." (Appellant's specification, paragraph 0006) (emphasis added).

Therefore, Fig. 1 should not be considered as admitted prior art and should not be considered as supporting the rejections made in the final Office Action.

(1) Claims 1, 12, 13, 24 and 31 are patentable over the APA and Romo:

This rejection fails because Appellant has not "admitted" as prior art the subject matter of Fig. 1 so designated erroneously by the Office Action.

Nevertheless, even if Fig. 1 were established as representing valid prior art, the teachings of Fig. 1 and Romo still fail to render obvious the subject matter recited in Appellant's claims.

Claim 1:

Specifically, claim 1 recites:

> A diffractive light device (DLD) comprising:
> a substrate;
> a force plate disposed on said substrate, said force plate configured to produce an electrostatic force in response to an applied voltage;
> a pixel plate supported by a flexure adjacent to said force plate, wherein a position of said pixel plate is controlled by said electrostatic force and by said flexure coupled to said pixel plate to display a pixel of an image;
> a temperature sensor thermally coupled to said flexure, without affecting movement of said flexure, and outputting a thermal measurement indicative of a temperature of said flexure; and
> a circuit that generates and applies a temperature compensated voltage to said force plate in response to said thermal measurement produced by said temperature sensor.

Thus, claim 1 recites a DLD that comprises a force plate that controls, by electrostatic force, the position of a pixel plate supported by a flexure. Claim 1 further recites a

temperature sensor "outputting a thermal measurement indicative of a temperature of said flexure" and "a circuit that generates and applies a temperature compensated voltage to said force plate in response to said thermal measurement produced by said temperature sensor." Moreover, "temperature sensor [is] *thermally coupled to said flexure*." (Emphasis added). This subject matter is outside the scope and content of the prior art.

According to the Office Action, the "APA does not expressly disclose a temperature sensor or compensating the applied voltage based on thermal measurements produced by a temperature sensor." (Action, p. 7). Consequently, the Action cites to Romo. However, Romo also fails to teach a temperature sensor in connection with a flexure supporting a pixel plate of a DLD as claimed.

Romo teaches two optical waveguides that are variably deflected into misalignment to obtain a desired degree of attenuation of an optical signal propagating between the two waveguides. (Romo, abstract). Romo does not teach, suggest or even mention a pixel plate and has nothing to do with a DLD.

Romo does mention "a temperature compensation coefficient that is used in determining the movable cantilever position [of a waveguide] necessary for a given optical attenuation." (Romo, col. 9, line 66-col. 10, line 4). However, Romo still does not teach or suggest the claimed temperature sensor *in connection with a flexure supporting a pixel plate of a DLD*. Specifically, Romo does not teach or suggest "a temperature sensor thermally coupled to said [pixel plate] flexure, without affecting movement of said flexure, and outputting a thermal measurement indicative of a temperature of said flexure."

Thus, Romo does not teach or suggest "a temperature sensor thermally coupled to said [pixel plate] flexure, without affecting movement of said flexure, and outputting a thermal measurement indicative of a temperature of said flexure." Similarly, the APA does not teach

or suggest "a temperature sensor thermally coupled to said [pixel plate] flexure, without affecting movement of said flexure, and outputting a thermal measurement indicative of a temperature of said flexure." The final Office Action does not address this feature of claim 1 or indicate how or where the cited prior art teaches this subject matter.

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966), the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue. In the present case, no prior art cited teaches or suggests "a temperature sensor thermally coupled to said [pixel plate] flexure, without affecting movement of said flexure, and outputting a thermal measurement indicative of a temperature of said flexure" and "a circuit that generates and applies a temperature compensated voltage to said force plate in response to said thermal measurement produced by said temperature sensor." This subject matter is outside the scope and content of the cited prior art and provides advantages that were not provided in the cited prior art. Given these significant differences between the scope of the prior art and the claimed subject matter, the rejection of claim 1 and its dependent claims should not be sustained.

For any and all of these reasons, the cited prior art cannot support a rejection of claim 1 under 35 U.S.C. § 103(a) and *Graham*. Therefore, the rejection of claim 1 and its dependent claims should not be sustained.

<u>Claim 12:</u>

Claim 12 recites:

> A micro-electro mechanical system (MEMS) comprising:
> a substrate;
> a pixel plate coupled to said substrate;
> a force plate disposed on said substrate adjacent to said pixel plate, wherein said force plate is configured to exert an electrostatic force on said pixel plate; and

a temperature sensor thermally coupled to said MEMS;
wherein said MEMS is configured to adjust said electrostatic force in response to a temperature measurement performed by said temperature sensor.

Thus, claim 12 recites "a force plate disposed on said substrate adjacent to said pixel plate, wherein said force plate is configured to exert an electrostatic force on said pixel plate" and "wherein said MEMS is configured to adjust said electrostatic force in response to a temperature measurement performed by said temperature sensor." In contrast, as demonstrated above, the APA does not teach or suggest the claimed temperature sensor or adjusting the electrostatic force exerted by a force plate in response to a temperature measurement performed by a temperature sensor.

Turning to Romo, Romo does not teach or suggest, and has nothing to do with, a pixel plate or a force plate exerting an electrostatic force on a pixel plate. Romo instead teaches deflecting a cantilevered waveguide.

Consequently, neither of the references teach or suggest the claimed adjustment of an electrostatic force exerted on a pixel plate by a force plate in response to a temperature measurement. The Examiner arrives at the opposite conclusion only using impermissible hindsight. The Federal Circuit has stressed that the "decision maker must step backward in time and into the shoes worn by a person having ordinary skill in the art when the invention was unknown and just before it was made." *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566 (Fed. Cir. 1987). Respectfully, "it is impermissible to use the claimed invention as an instruction manual or 'template' to piece together the teachings of the prior art so that the claimed invention is rendered obvious"; *Interconnect Planning Corp. v. Feil,* 774 F.2d 1132,1141, 227 USPQ 543, 550 (Fed. Cir. 1985); *W.L. Gore & Assocs. v. Garlock, Inc.,* 721 F.2d 1540, 1553, 220 USPQ 303, 312-13 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984)

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966), the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue. In the present case, no prior art cited teaches or suggests the claimed MEMS "wherein said MEMS is configured to adjust said electrostatic force [on a pixel plate] in response to a temperature measurement performed by said temperature sensor." This subject matter is outside the scope and content of the cited prior art and provides advantages that were not provided in the cited prior art.

For at least these reasons, the rejection of claim 12 and its dependent claims should not be sustained.

Claim 24:

Independent claim 24 recites:

> An image display device comprising:
> a system controller;
> a variable voltage source communicatively coupled to said system controller; and
> an array of DLDs communicatively coupled to said variable voltage source, each DLD of said DLD array including a substrate, a force plate disposed on said substrate, said force plate configured to produce an electrostatic force in response to a voltage applied by said voltage source, a pixel plate disposed adjacent to said force plate, wherein a position of said pixel plate is determined by said electrostatic force and a flexure coupled to said pixel plate, and a temperature sensor thermally coupled to said DLD so as to determine a temperature of said flexure, wherein said image display device is configured to vary said electrostatic force in response to a temperature measurement performed by said temperature sensor.

In contrast, as demonstrated above, the cited prior art references do not include or provide for a temperature sensor in connection with a pixel plate, "wherein said image display device is configured to vary said electrostatic force [*positioning the pixel plate*] in response to a thermal measurement performed by said temperature sensor." Moreover, the teachings of the cited prior art do not include or provide for a temperature sensor "thermally coupled to

said DLD so as *to determine a temperature of said flexure*." (Emphasis added). For at least these reasons, the rejection of claim 24 and its dependent claims should not be sustained.

Claim 31:

Claim 31 recites:

> A diffractive light device (DLD) comprising:
> a substrate;
> a means for producing an electrostatic force disposed on said substrate, wherein said electrostatic force is produced in response to an applied voltage;
> a means for diffracting light disposed adjacent to said electrostatic force producing means, wherein a position of said light diffracting means is influenced by a means for flexing coupled to said means for diffracting light; and
> a means for sensing temperature thermally coupled to said DLD, wherein said means for sensing temperature is configured to produce a temperature compensated voltage on said means for producing an electrostatic force in response to a thermal measurement.

In contrast, as demonstrated above, the teachings of the cited prior art do not include or provide for a means for sensing temperature thermally coupled to a DLD, "wherein said means for sensing temperature is configured to produce a temperature compensated voltage on said means for producing an electrostatic force in response to a thermal measurement." For at least these reasons, the rejection of claim 31 and its dependent claims should not be sustained.

(2) Claims 2, 3, 5-8, 14-16, 18-21, 25, 26, 28, 29, 32, 33, 35-38, 56 and 63 are patentable over the APA, Romo and McCartney:

This rejection is respectfully traversed for the reasons given above with respect to the patentability of the independent claims 1, 12, 24 and 31, and for the following additional reasons.

Claim 2:

Claim 2 recites:

> an offset voltage generator, wherein said offset voltage generator is configured to generate a temperature compensated offset voltage based on said thermal measurement; and
>
> a summing element for adding said offset voltage to a reference voltage to produce said temperature compensated voltage.

In contrast, the combination of cited prior art fails to teach or suggest this subject matter. The Office Action concedes that APA and Romo fail to teach or suggest the claimed offset voltage generator. (Action, p. 10). Consequently, the action cites to McCartney on this point. (*Id.*).

McCartney is directed to a liquid crystal display (LCD). According to McCartney, "it is necessary that the temperature of the liquid crystal material of the display be high enough for sufficient display response time." (McCartney, col. 4, lines 9-12). Accordingly, McCartney teaches a temperature sensor and "a digital signal that identifies the voltage needed, at the temperature determined by the temperature sensing element to obtain the correct optical transmission," i.e., the desired response time. (McCartney, col., 4, lines 24-33).

As will be well-known to those of skill in the art, an LCD operates on entirely different principles than does a DLD. Consequently, it is unclear how or why one of skill in the art would have obviously applied the teachings of McCartney regarding and LCD to the DLD of the APA (assuming the APA can even be cited in this rejection).

According to the Action, "[w]hile [an] LCD does function differently that a DLD, this would not affect the manner in which temperature compensated voltages are generated." (Action, p. 4). Appellant believes this position is incorrect on its face. The driving signal for

a cold liquid crystal would clearly be subject to different parameters, considerations and equations, than would a voltage on a force plate in a DLD.

Appellant believes the Action thus fails to make out a *prima facie* case of obviousness with respect to claim 2. For at least this additional reason, the rejection of claim 2 should not be sustained.

Claim 3:

Claim 3 recites "wherein said temperature compensated offset voltage is configured to compensate for a change in spring force exerted on said pixel plate by said flexure at a measured temperature." Claims 14, 25 and 33 recites similar subject matter.

As demonstrated above, to the extent that McCartney teaches an offset voltage generator, that offset voltage is created "to obtain the correct optical transmission" of the liquid crystal material based on temperature. (McCartney, col., 4, lines 24-33). This clearly has nothing to do with "a change in spring force exerted on said pixel plate by said flexure. Consequently, the cited collection of prior art does not include within its scope the claimed temperature compensated offset voltage "configured to compensate for a change in spring force exerted on said pixel plate by said flexure at a measured temperature." For at least this additional reason, the rejection of claims 3, 14, 25 and 33 should not be sustained.

Claim 8:

Claim 8 recites:

> wherein said summing element comprises a summing circuit, wherein said summing circuit is configured to combine said temperature compensated offset voltage with each of a plurality of color specific voltages to produce a temperature compensated voltage corresponding to each of a plurality of colors produced by pixel elements of said DLD.

Claim 21 recites similar subject matter.

In contrast, the cited prior art utterly fails to teach or suggest the claimed summing circuit "configured to combine said temperature compensated offset voltage with each of a plurality of color specific voltages to produce a temperature compensated voltage corresponding to each of a plurality of colors produced by different pixel elements of said DLD." This subject matter is entirely outside the scope and content of the prior art. For at least this additional reason, the rejection of claims 8 and 21 should not be sustained.

Claim 15:

Claim 15 recites "an offset voltage generator, wherein said offset voltage generator is configured to vary said electrostatic force based on said temperature measurement." As demonstrated above, to the extent that McCartney teaches an offset voltage generator, that offset voltage is the voltage "to obtain the correct optical transmission" of the liquid crystal material based on temperature. (McCartney, col., 4, lines 24-33). This clearly has nothing to do with "vary[ing] said electrostatic force" of a MEMS force plate as recited in claim 15. For at least this additional reason, the rejection of claim 15 should not be sustained.

Claim 16:

Claim 16 recites "wherein said temperature compensated offset voltage generator is configured to produce an offset voltage to compensate for said variation in spring force provided by said flexure." As demonstrated above, the cited prior art does not teach or suggest an offset voltage generator that "compensate[s] for said variation in spring force

provided by said flexure." For at least this additional reason, the rejection of claim 16 should not be sustained.

Claim 63:

Claim 63 recites "an array of corresponding pixel and force plates; and an offset voltage generator that applies an offset voltage based on said temperature measurement to a global MEMS bias signal used by said force plates." As demonstrated above, the cited prior art does not teach or suggest an offset voltage generator that "applies an offset voltage based on said temperature measurement to a global MEMS bias signal used by said force plates." The LCD of McCartney does not include or have relevance to an array of pixel and force plates or an offset voltage generator operating with a global MEMS bias signal used by such force plates. For at least this additional reason, the rejection of claim 63 should not be sustained.

(3) Claims 10, 11, 23, 30 and 39 are patentable over the APA, Romo and Mori:

This rejection is respectfully traversed for the reasons given above with respect to the patentability of the independent claims 1, 12, 24 and 31, and for the following additional reasons.

Claim 11:

Claim 11 recites "wherein said temperature sensor is configured to measure an average temperature of flexures in an array of DLDs." Claim 30 recites similar subject matter.

In this regard, the final Office Action argues that "Mori discloses measuring average temperature in column 6, lines 30-45." Action, p. 4). However, the Action neglects to note that Mori *does not* teach or suggest measuring the average temperature of flexures in an array of DLDs.

A large number of devices may exist in the prior art where, if the prior art is disregarded as to its content, purpose, mode of operation and general context, the several elements claimed by the Applicant, if taken individually, may be disclosed. Adopting this strategy, the final Office Action is consistently trying to read subject matter into the prior art that is not actually there.

Mori teaches a liquid crystal apparatus that has nothing to do with DLDs or flexures. Consequently, Mori cannot reasonably be taken as teaching the claimed temperature sensor "configured to measure an average temperature of flexures in an array of DLDs." This subject matter is not taught by, suggested by or within the scope of the prior art of record. For at least this additional reason, the rejection of claim 11 and 30 should not be sustained.

(4) Claims 4, 17, 27 and 34 are patentable over the APA, Romo and Naiki:

This rejection is respectfully traversed for the reasons given above with respect to the patentability of the independent claims 1, 12, 24 and 31, and for the following additional reasons.

Claim 4:

Claim 4 recites:

wherein said offset voltage generator comprises:
a buffer amplifier;
a low pass filter electrically coupled to said buffer amplifier; and

a scaler/offset amplifier electrically coupled to said low pass filter.

The other claims, 17, 27 and 34, recite similar subject matter.

In this regard, the Office Action cites three elements in three different figures of Naiki. (Action, pp. 13-14). However, in reality, Naiki does not teach or suggest the claimed offset voltage generator. For example, Naiki does not teach a low pass filter as part of an offset voltage generator as claimed.

In this regard, the Office Action refers to a digital averaging circuit 13, which clearly is not a low pass filter coupled between a buffer amplifier and a scaler/offset amplifier as claimed. (Action, p. 5 citing Naiki at col. 11, lines 46-49). The Action argues that "column 11 lines 46-49 disclose that the circuit [averaging circuit 13] is actually performing a low pass filter functionality." (Action, p. 5). This is entirely incorrect. The cited portion of Naiki describes the circuit (13) as a "noise filter." (Naiki at col. 11, lines 46-49). There is no teaching or suggest here that the circuit (13) comprises a low pass filter.

Thus, the cited prior art has not been shown to teach or suggest the offset voltage generator of claim 4 and the other noted claims. For at least this additional reason, the rejection of these claims should not be sustained.

<u>(5) Claims 40, 42, 44-46 and 49-54 are patentable over McCartney and the APA:</u>

This rejection is respectfully traversed for the reasons given above with respect to the patentability of the independent claims 1, 12, 24 and 31, and for the following additional reasons.

Claim 40:

Claim 40 recites:

> A method of compensating for thermal effects in a DLD comprising:
> measuring a temperature of said DLD;
> generating a temperature compensated offset voltage associated with an effect said temperature will have on said DLD; and
> producing a temperature compensated voltage on said DLD using said temperature compensated offset voltage, wherein applying said temperature compensated voltage to said DLD compensates for said thermal effects.

With regard to claim 40, Appellant wishes to note that: "The materials on which a process is carried out must be accorded weight in determining the patentability of a process. *Ex parte Leonard*, 187 USPQ 122 (Bd. App. 1974)." (See MPEP § 2116).

As noted above, there actually is no admitted prior art in Appellant's specification. Consequently, APA cannot support any rejection of Appellant's claims.

Moreover, McCartney is directed to a liquid crystal display and measures the temperature of the liquid crystal material. (McCartney, col. 4, lines 9-12). Thus, McCartney also does not teach or suggest "measuring a temperature of [a] DLD."

Consequently, McCartney cannot teach or suggest any of the subject matter of claim 40. Neither teaches "measuring a temperature of [a] DLD." Neither teaches "generating a temperature compensated offset voltage associated with an effect said temperature will have on said DLD." Neither teaches "producing a temperature compensated voltage on said DLD using said temperature compensated offset voltage, wherein applying said temperature compensated voltage to said DLD compensates for said thermal effects."

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966), the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue. In the case of claim 40, all of the elements of the method of claim 40 appear to be beyond the scope of the prior art as

evidenced by McCartney. The prior art does not provide for a method of compensating for thermal effects in a DLD as recited in claim 40. For at least these reasons, the rejection of claim 40 should not be sustained.

Claim 50:

Claim 50 recites:

> A processor readable medium having instructions thereon that are executable by a processor for:
> sensing a temperature change of a DLD; and
> modifying a voltage provided to said DLD in response to said sensed temperature change.

In contrast, as demonstrated above, the teachings of McCartney fail to teach or suggest any of this subject matter. No reference teaches or suggests executable instructions on a processor readable medium for "sensing a temperature change of a DLD" or for "modifying a voltage provided to said DLD in response to said sensed temperature change."

Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966), the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue. In the case of claim 50, all of the subject matter of claim 50 appears to be beyond the scope of the prior art as evidenced by McCartney. The prior art does not provide for a processor instructions for sensing temperature change in a DLD and modifying a voltage provided to the DLD in response. For at least these reasons, the rejection of claim 50 should not be sustained.

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(6) Claim 41 is patentable over McCartney, the APA and Romo:

This rejection should not be sustained for at least the same reasons given above with respect to the patentability of claim 40.

(7) Claim 43 is patentable over McCartney, the APA and Naiki:

This rejection should not be sustained for at least the same reasons given above with respect to the patentability of claim 40.

(8) Claims 47 and 48 are patentable over McCartney, the APA and Mori:

This rejection should not be sustained for at least the same reasons given above with respect to the patentability of claim 40.

In view of the foregoing, it is submitted that the final rejection of the pending claims is improper and should not be sustained. Therefore, a reversal of the Rejection of March 24, 2008 is respectfully requested.

Respectfully submitted,

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Steven L. Nichols
Registration No. 40,326

Steven L. Nichols, Esq.
Managing Partner, Utah Office
Rader Fishman & Grauer PLLC
River Park Corporate Center One
10653 S. River Front Parkway, Suite 150
South Jordan, Utah 84095
(801) 572-8066
(801) 572-7666 (fax)

VIII. CLAIMS APPENDIX

1. A diffractive light device (DLD) comprising:

a substrate;

a force plate disposed on said substrate, said force plate configured to produce an electrostatic force in response to an applied voltage;

a pixel plate supported by a flexure adjacent to said force plate, wherein a position of said pixel plate is controlled by said electrostatic force and by said flexure coupled to said pixel plate to display a pixel of an image;

a temperature sensor thermally coupled to said flexure, without affecting movement of said flexure, and outputting a thermal measurement indicative of a temperature of said flexure; and

a circuit that generates and applies a temperature compensated voltage to said force plate in response to said thermal measurement produced by said temperature sensor.

2. The DLD of claim 1, wherein said circuit comprises:

an offset voltage generator, wherein said offset voltage generator is configured to generate a temperature compensated offset voltage based on said thermal measurement; and

a summing element for adding said offset voltage to a reference voltage to produce said temperature compensated voltage.

3. The DLD of claim 2, wherein said temperature compensated offset voltage is configured to compensate for a change in spring force exerted on said pixel plate by said flexure at a measured temperature.

4. The DLD of claim 2, wherein said offset voltage generator comprises:

a buffer amplifier;

a low pass filter electrically coupled to said buffer amplifier; and

a scaler/offset amplifier electrically coupled to said low pass filter.

5. The DLD of claim 2, wherein said offset voltage generator comprises:

a signal digitizer configured to digitize said thermal measurement;

a system controller communicatively coupled to said signal digitizer; and

a data storage device communicatively coupled to said system controller, wherein said data storage device contains a plurality of offset voltage values associated with said digitized thermal measurement.

6. The DLD of claim 2, wherein said offset voltage generator comprises:

a signal digitizer configured to digitize said thermal measurement;

a system controller communicatively coupled to said digitizer, said system controller configured to combine said digitized thermal measurement to an uncompensated digital color count; and

a digital to analog converter communicatively coupled to said system controller, wherein said digital to analog converter is configured to convert said combined digital signal into a thermally compensated analog voltage.

7. The DLD of claim 2, further comprising a variable voltage source communicatively coupled to said offset voltage generator, wherein said variable voltage

source is configured to generate a temperature compensated offset voltage in response to a command signal received from said offset voltage generator.

8. The DLD of claim 2, wherein said summing element comprises a summing circuit, wherein said summing circuit is configured to combine said temperature compensated offset voltage with each of a plurality of color specific voltages to produce a temperature compensated voltage corresponding to each of a plurality of colors produced by pixel elements of said DLD.

9. (cancelled)

10. The DLD of claim 1, wherein said temperature sensor comprises one of a thermal sense resistor or a diode bandgap.

11. The DLD of claim 10, wherein said temperature sensor is configured to measure an average temperature of flexures in an array of DLDs.

12. A micro-electro mechanical system (MEMS) comprising:

a substrate;

a pixel plate coupled to said substrate;

a force plate disposed on said substrate adjacent to said pixel plate, wherein said force plate is configured to exert an electrostatic force on said pixel plate; and

a temperature sensor thermally coupled to said MEMS;

wherein said MEMS is configured to adjust said electrostatic force in response to a temperature measurement performed by said temperature sensor.

13. The MEMS of claim 12, further comprising:

a support post extruding from said substrate; and

a flexure coupling said pixel plate to said support post, wherein said flexure is configured to exert a spring force on said pixel plate opposing said electrostatic force;

said spring force predictably varying with a variation in temperature.

14. The MEMS of claim 13, wherein said MEMS is further configured to vary said electrostatic force to compensate for a variation in spring force provided by said flexure at a measured temperature.

15. The MEMS of claim 13, further comprising an offset voltage generator, wherein said offset voltage generator is configured to vary said electrostatic force based on said temperature measurement.

16. The MEMS of claim 15, wherein said temperature compensated offset voltage generator is configured to produce an offset voltage to compensate for said variation in spring force provided by said flexure.

17. The MEMS of claim 16, wherein said offset voltage generator comprises:

a buffer amplifier;

a low pass filter electrically coupled to said buffer amplifier; and

a scaler/offset amplifier electrically coupled to said low pass filter.

18. The MEMS of claim 15, wherein said offset voltage generator comprises:

a signal digitizer configured to digitize said temperature measurement;

a system controller communicatively coupled to said signal digitizer; and

a data storage device communicatively coupled to said system controller, wherein said data storage device contains a plurality of offset voltage values associated with said digitized temperature measurement.

19. The MEMS of claim 15, wherein said offset voltage generator comprises

a signal digitizer configured to digitize said thermal measurement;

a system controller communicatively coupled to said digitizer, said system controller configured to combine said digitized thermal measurement to a uncompensated digital color count; and

a digital to analog converter communicatively coupled to said system controller, wherein said digital to analog converter is configured to convert said combined digital signal into a thermally compensated analog voltage.

20. The MEMS of claim 15, further comprising a variable voltage source communicatively coupled to said offset voltage generator, wherein said variable voltage

source is configured to generate a temperature compensated offset voltage in response to a command signal received from said offset voltage generator.

21. The MEMS of claim 15, further comprising a summing circuit, wherein said summing circuit is configured to combine a temperature compensated offset voltage from said offset voltage generator with each of a plurality of color specific voltages to produce an electrostatic force corresponding to each of a plurality of colors produced by said pixel plate.

22. (cancelled)

23. The MEMS of claim 12, wherein said temperature sensor comprises one of a thermal sense resistor or a diode bandgap.

24. An image display device comprising:

a system controller;

a variable voltage source communicatively coupled to said system controller; and

an array of DLDs communicatively coupled to said variable voltage source, each DLD of said DLD array including a substrate, a force plate disposed on said substrate, said force plate configured to produce an electrostatic force in response to a voltage applied by said voltage source, a pixel plate disposed adjacent to said force plate, wherein a position of said pixel plate is determined by said electrostatic force and a flexure coupled to said pixel plate, and a temperature sensor thermally coupled to said DLD so as to determine a temperature of said flexure, wherein said image display device is configured to vary said electrostatic force in response to a temperature measurement performed by said temperature sensor.

25. The image display device of claim 24, wherein said image display device is configured to vary said electrostatic force by varying a temperature-compensated offset voltage to compensate for a change in spring force exerted on said pixel plate by said flexure at a measured temperature.

26. The image display device of claim 24, further comprising an offset voltage generator configured to generate said temperature compensated offset voltage.

27. The image display device of claim 26, wherein said offset voltage generator comprises:

a buffer amplifier;

a low pass filter electrically coupled to said buffer amplifier; and

a scaler/offset amplifier electrically coupled to said low pass filter.

28. The image display device of claim 26, wherein said offset voltage generator comprises:

a signal digitizer communicatively coupled to said system controller, said signal digitizer being configured to digitize said thermal measurement; and

a data storage device communicatively coupled to said system controller, wherein said data storage device contains a plurality of offset voltage values associated with said digitized thermal measurement.

29. The image display device of claim 26, wherein said offset voltage generator comprises:

a signal digitizer configured to digitize said thermal measurement;

a system controller communicatively coupled to said digitizer, said system controller configured to combine said digitized thermal measurement to a uncompensated digital color count; and

a digital to analog converter communicatively coupled to said system controller, wherein said digital to analog converter is configured to convert said combined digital signal into a thermally compensated analog voltage.

30. The image display device of claim 24, wherein said temperature sensor is configured to measure an average temperature of flexures in said array of DLDs.

31. A diffractive light device (DLD) comprising:

a substrate;

a means for producing an electrostatic force disposed on said substrate, wherein said electrostatic force is produced in response to an applied voltage;

a means for diffracting light disposed adjacent to said electrostatic force producing means, wherein a position of said light diffracting means is influenced by a means for flexing coupled to said means for diffracting light; and

a means for sensing temperature thermally coupled to said DLD, wherein said means for sensing temperature is configured to produce a temperature compensated voltage on said means for producing an electrostatic force in response to a thermal measurement.

32. The DLD of claim 31, further comprising an offset voltage generator, wherein said offset voltage generator is configured to generate a temperature compensated offset voltage based on said thermal measurement.

33. The DLD of claim 32, wherein said temperature compensated offset voltage is configured to compensate for a change in spring force exerted on said means for diffracting light by said means for flexing at a measured temperature.

34. The DLD of claim 32, wherein said offset voltage generator comprises:

a buffer amplifier;

a low pass filter electrically coupled to said buffer amplifier; and

a scaler/offset amplifier electrically coupled to said low pass filter.

35. The DLD of claim 32, wherein said offset voltage generator comprises:

a means for digitizing said thermal measurement;

a means for controlling said DLD communicatively coupled to said signal digitizer; and

a means for storing data communicatively coupled to said controlling means, wherein said storage means contains a plurality of offset voltage values associated with said digitized thermal measurement.

36. The DLD of claim 35, further comprising a means for generating a variable voltage communicatively coupled to said controlling means, wherein said variable voltage

generating means is configured to generate a temperature compensated offset voltage in response to a command signal received from said controlling means.

37. The DLD of claim 31, further comprising a means for summing voltages, wherein said means for summing is configured to combine said temperature compensated offset voltage with a color voltage bias to produce said temperature compensated voltage.

38. The DLD of claim 37, wherein said color voltage bias comprises a non-compensated voltage bias.

39. The DLD of claim 31, wherein said temperature sensing means comprises one of a thermal sense resistor or a diode bandgap.

40. A method of compensating for thermal effects in a DLD comprising:

measuring a temperature of said DLD;

generating a temperature compensated offset voltage associated with an effect said temperature will have on said DLD; and

producing a temperature compensated voltage on said DLD using said temperature compensated offset voltage, wherein applying said temperature compensated voltage to said DLD compensates for said thermal effects.

41. The method of claim 40, wherein said thermal effects comprise a change in spring force exerted by a flexure on a pixel plate.

42. The method of claim 40, wherein said generating a temperature compensated offset voltage comprises:

generating a signal in response to said measurement; and

providing said signal to an offset voltage generator, wherein said offset voltage generator is configured to generate said temperature compensated offset voltage based on said signal.

43. The method of claim 42, wherein said offset voltage generator comprises

a buffer amplifier;

a low pass filter electrically coupled to said buffer amplifier; and

a scaler/offset amplifier electrically coupled to said low pass filter.

44. The method of claim 42, wherein said generating a temperature compensated offset voltage comprises:

digitizing said signal;

transmitting said digitized signal to a system controller;

associating said digitized signal to a corresponding temperature compensated offset voltage value stored in a memory storage device; and

commanding a variable voltage source to produce a voltage corresponding to said temperature compensated voltage value.

45. The method of claim 42, wherein said generating a temperature compensated offset voltage comprises:

digitizing said signal;

transmitting said digitized signal to a system controller;

combining said digitized signal to a digital color count; and

converting said combined signal to an analog voltage.

46. The method of claim 40, wherein said measuring a temperature of said DLD comprises:

thermally coupling a thermal sensor to said DLD; and

sensing a temperature of said DLD.

47. The method of claim 46, wherein said thermal sensor comprises one of a thermal sensor resistor or a diode bandgap.

48. The method of claim 47, wherein said thermal sensor measures an average temperature of an array of DLDs.

49. The method of claim 40, wherein said producing a temperature compensated voltage on said DLD comprises summing said temperature compensated offset voltage with an uncompensated voltage bias.

50. A processor readable medium having instructions thereon that are executable by a processor for:

sensing a temperature change of a DLD; and

modifying a voltage provided to said DLD in response to said sensed temperature change.

51. The processor readable medium of claim 50, wherein said modifying a voltage provided to said DLD comprises:

receiving a signal associated with said sensed temperature change; and

generating a temperature compensated offset voltage based on said signal.

52. The processor readable medium of claim 51, wherein said processor readable medium further has instructions thereon that are executable by a processor for:

digitizing said signal;

providing said digitized signal to a data storage device; and

receiving a temperature compensated offset voltage value from said data storage device.

53. The processor readable medium of claim 52, wherein said data storage device comprises a data lookup table.

54. The processor readable medium of claim 51, wherein said processor readable medium further has instructions thereon that are executable by a processor for:

digitizing said signal;

combining said digitized signal with a digital color count; and

converting said combined signal to an analog voltage.

55-62. (cancelled)

63. The MEMS of claim 12, further comprising:

an array of corresponding pixel and force plates; and

an offset voltage generator that applies an offset voltage based on said temperature measurement to a global MEMS bias signal used by said force plates.

IX. Evidence Appendix

None

X. Related Proceedings Appendix

None

XI. Certificate of Service

None